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Corporation  
Old Orchard Road  
Armonk, N.Y. 10504(US)

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(72) Inventor: Pascoe, Robert August  
3237 Oak Tree Lane  
Grapevine Texas 76051(US)

(64) Designated Contracting States:  
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(74) Representative: Bailey, Geoffrey Alan  
IBM United Kingdom Limited Intellectual  
Property Department Hursley Park  
Winchester Hampshire SO21 2JN(GB)

(71) Applicant: International Business Machines

### (54) Text processing system using text cells.

(57) Text Cells are provided which define the boundaries into which text data can be formatted for presentation. The definition of Text Cells is controlled by two data stream commands which are the Define Text Cell (DTC), and Open Text Cell (OTC). The DTC command specifies the parameters associated with a Text Cell Chain. This command includes a set of global parameters to be applied to each Text Cell to be presented following the issuance of this command. The OTC command causes an individual Text Cell to be established. That is, the area associated with the Text Cell is opened, the presentation parameters for the cell are set, and the text information which follows this current Open Text Cell, but precedes a subsequent Open Text Cell, is processed into this area. Text Cells can have presentation attributes which are independent of the attributes of the text presented therein, and which govern presentation characteristics not usually associated with text presentation. Additionally, multiple text cells can be specified on a presentation page, and the relationship of individual Text Cells to other Text Cells on the presentation page can be described.

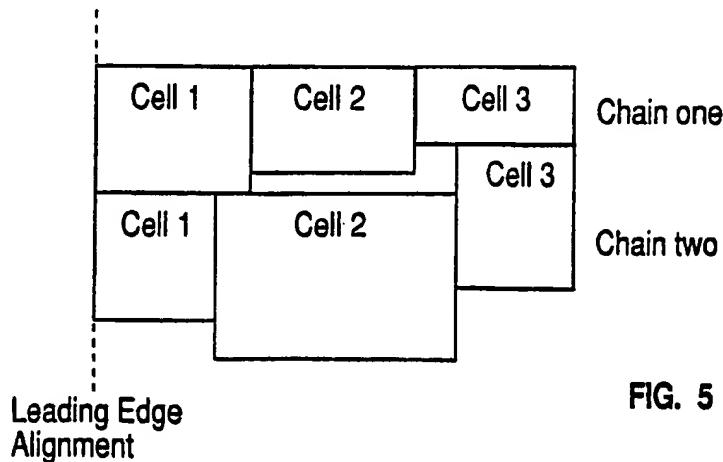


FIG. 5

## TEXT CELLS

This invention relates to a system and technique in which text is formatted within individual cells in a data processing system.

With conventional word processing systems, the formatting of text into a table has always been an arduous task. Typically an operator will have to convert the horizontal dimensions of the table into tab positions, and then key text one horizontal print line at a time, placing the data from each table entry at the associated tab stops.

From this it is noted that the operator does not have the aid of the word processing system in forming the line endings within a table entry, as there is only one margin setting associated with the horizontal print line. Therefore, rather than "power type" the contents of each table entry, the operator must watch the cursor position of each character and determine visually when the limits of the table are reached, then tab to the beginning of the next table entry position and begin typing the contents of that table position, and so on, for each horizontal print line.

The operator must reestablish the location in the input manuscript each time a table position is changed. The operator must also manually skip space as required in the table entries by applying the correct tab sequences. It is also the operator's duty to manually align the tables' positions as required. For example, it may be desired that the bottoms of all tables be aligned to the bottom of the table containing the most text.

If the table has highlighting or outline requirements, the complexity is compounded when using prior art word processing for presentation of tabular text. Again, this complexity is inherent with techniques that deal with entire, horizontal lines of text, with one left margin and one right margin. If, for example, it is desired to underline some text within a columnar table, the operator would have to turn underlining on and off on each line of the table. Rather than go through such a tedious procedure, the operator typically removes the final copy of the table, takes out a marker and/or straightedge, and manually underlines the appropriate text within the table.

A further difficulty in the above example is that the function of Spell Check with hyphenation cannot be accomplished since words associated with each other in the text are not contiguous on a horizontal print line.

More sophisticated word processing programs, such as the IBM Displaywrite 3 word processing program provide keying aids for the generation of tables, but this product only stores the formatted results of the table generation process and not the formatting parameters associated with the generation of the table. Therefore, the intent of the generating operator cannot be interchanged, and as a result, the revision of a table so generated is much more difficult than its original generation.

It would, therefore, be greatly advantageous for operators of conventional word processing systems to be able to generate and revise tables in an improved manner, such that text associated with each table is treated as an coherent entity and not as a portion of a horizontal line containing other text not associated therewith.

The present invention provides a method of formatting text in a data processing system comprising the steps of:

- 40 detecting a plurality of data items in a data stream, said data items including control command codes or text character codes or both;
- 40 detecting an open text cell data stream command to open a text cell, said text cell having boundary and presentation attribute information associated therewith;
- 45 opening said text cell in response to said open text cell command;
- 45 presenting said text cell in accordance with said presentation attribute information; and formatting text within said text cell.

The invention also provides a data processing system comprising means for performing the above method of formatting text.

Accordingly, a Text Cell is provided which is a parallelogram defining an area into which text data can be formatted for presentation. The Text Cell defines the boundaries for the text presentation. Well known and understood text formatting concepts such as margins, tabs, line density, etc., can be applied to the text as it is formatted into the Text Cell.

The definition of Text Cells, including the Text Cell Attributes, the location and text content of the cells, the clustering of the cells into sets and the chaining of cells is controlled by two data stream commands. These are the Define Text Cell, and Open Text Cell commands.

The Define Text Cell command specifies the parameters associated with a Text Cell Chain. The Define

Text Cell is a declarative which specifies a set of global parameters to be applied to each Text Cell to be presented following the issuance of this command. These parameters may be overridden for each individual Text Cell, but once that individual Text Cell is presented, all parameters revert back to the values specified in this command.

- 5 The second command, Open Text Cell, causes an individual Text Cell to be established. That is, the area associated with the Text Cell is opened, the presentation parameters for the cell are set, and the text information which follows this current Open Text Cell, but precedes a subsequent Open Text Cell, is processed into this area. Each Text Cell within a Text Cell Chain begins with an Open Text Cell.

10 The Open Text Cell contains a 'Chain ID' that defines the Text Cell chain within a Text Cell Group to which the current cell belongs.

Each Open Text Cell contains a group of optional parameters. These parameters may be used to override the global Text Cell parameters specified in the Define Text Cell command for the processing of this specific Text Cell. If this override is used, it affects only the current cell, and the global parameters are reestablished when processing in the current cell is completed.

15 One of the advantages that Text Cells provide over the current text formatting concepts is that a Text Cell can have presentation attributes which are independent of the attributes of the text presented therein, and which govern presentation characteristics not usually associated with text presentation. For example, each Text Cell may have an outline attribute, a shading attribute, and a colour attribute. The outline attribute governs the line type, line thickness, dimension and colour of the boundary of the Text Cell. The shading attribute governs the pattern which fills the cell. That is, the area of the Text Cell may be filled with a specific shading pattern. The colour attribute governs the background colour of the Text Cell area. That is, the area of the Text Cell is filled with the specified colour.

20 Text Cells also provide advantages over the present text formatting techniques, because multiple text cells can be specified on a presentation page, and the relationship of individual Text Cells to other Text Cells on the presentation page can be described.

In order that the invention may be fully understood a preferred embodiment thereof will now be described, by way of example only, with reference to the accompanying drawings in which:-

Fig. 1 shows a plurality of examples of individual text cells and the border choices available therewith.

25 Fig. 2 shows a chain of text cells.

Fig. 3 shows an example of the automatic height adjustment parameter associated with text cells within a chain.

Fig. 4 shows the alignment of the leading edges of text cell chains within a group.

Fig. 5 shows the alignment of the top edges of text cell chains within a group.

30 Fig. 6 is a flow diagram of the text cell processing routine.

Fig. 7 is a flow diagram of the Open Text Cell command routine.

Fig. 8 is a flow diagram of the Set-Up for Text Cell Processing routine.

Fig. 9 is a flow diagram of the Current Cell Process routine.

Fig. 10 is a flow diagram of the Adjust Cell Area routine.

40 Fig. 11 is a flow diagram of the Set-Up for Next Chain routine.

Fig. 12 is a flow diagram of the Position Cells routine.

Fig. 13 is a flow diagram of the Draw Cells routine.

An individual Text Cell or cell is the smallest entity of a parallelogram which defines an area into which text or other such presentation data can be formatted for presentation. Fig. 1 shows a plurality of examples of individual text cells and a number of border choices available therewith. The border choices shown are: thin line border; dashed line border; dotted line border; thick line border; and invisible (no line) border. A row of horizontally contiguous cells may be concatenated into a Chain of cells. A chain of cells is shown in Fig. 2. Figure 3 shows a chain of cells before and after automatic height adjustment. Chains of cells may be concatenated into a Group of cells. Figure 4 shows a group of two chains of cells. The leading edges of the chains are aligned with an imaginary line. Figure 5 shows a group of two further chains of cells. In this example the top edges of the text cells are also aligned. In this description, each cell should be thought of as belonging to both a chain and a group although that cell may be the only cell in the chain and the chain in which that cell is the only member may be the only chain in the group.

Fig. 6 is the first flow diagram of the text cell processing routine. In Fig. 6, a control processor routine, 55 which has access to an output data stream, tests each code of the data stream for codes pertinent to text cells. At 20 a currently addressed code in the data stream is tested for a Define Text Cell (DTC) command code. Assuming that the code currently being tested is not a DTC command, at 22 this code is tested to determine if it is an Open Text Cell (OTC) command code. If this code is not an OTC command, at 24 the

operation proceeds to process other control codes in the data stream. During this operation, if at 25 a Cells-in-Process indicator is turned on, the operation proceeds to 26, as described below. If at 25 the Cells-in-Process indicator is not on, the operation continues by looping back to 20, at which time the next code in the data stream is tested.

5 Assume now that an DTC command is detected at 20. At 21 a Global-Text-Cell-Attribute control block is set to the particular attribute settings that are a part of the DTC command. As described above, although individual cells within a chain of cells can have attributes different from these default attribute settings of the cells of this chain, these will be the default attributes to define the characteristics of the text cells within this chain, including the type of border to be used around the cells (if any), the background shading and colour 10 of the cells (if any), and whether or not the lengths of the cells are variable or fixed. The operation then proceeds to 22 and, since the current code is a DTC command, this code is not an OTC command and the operation proceeds to 24 and continues as described above.

Again, note that the DTC command does not actually establish a text cell. The DTC command establishes default values for the attributes of the next chain of text cells that is opened, although these 15 values of are simply default values and may be changed for each text cell at the time an OTC command is created.

The following programming design language listing is another form of the description of the above control processor routine. This listing parallels the operation described above for Fig. 6.

20

CONTROL\_PROCESSOR Routine

25

If the control being processed is a Define Text Cell

35

Then  
Set the Global-Text-Cell-Attribute control block to the  
attribute settings in the Define Text Cell.

End If

35

If the control being processed is an Open Text Cell

40

Then  
Process the Open\_Text\_Command Routine

End If

45

Process Other Controls,

50

If the Cells-in-Process indicator is on

55

Then  
If the current control causes the baseline of the text  
in the cell to exceed the height of the current text  
cell,

```

      Then
5       If the height-dimension attribute of the current
         Text Cell is 'variable'

      Then
10      Adjust the height of the current text cell to be
         equal to the current baseline of the text in the
         cell

15      Determine if the cells which preceded this cell
         in the current chain require associated height
         adjustment (process Adjust_Cell_Area Routine)

20

      Else
25      Tell user that text exceeds the size of
         current text cell.

      End If
30      End If
35      End If

CONTINUE

```

For an OTC command, a branch is taken to the Open Text Cell Command routine in Fig. 7. In Fig. 7, at 35 a test is made to determine if the OTC command is to open the last text cell in a text cell group. The 40 OTC command includes an attribute which may be used to terminate a group rather than to open another text cell; therefore, this test is made to determine if the currently addressed OTC command indicates that the cell about to be opened is the last cell in the group. Assuming that the text cell about to be processed is not the last text cell in a group, the operation proceeds to 36 wherein a test is made to determine if a Cells-in-Process flag is on. Assume now that this is the first text cell in a group; therefore, the Cells-in- 45 Process flag is not on. At 37 the Set-Up for Text Cell Processing routine is called, which routine is shown in detail in Fig. 8.

Referring now to Fig. 8, in the Set-Up for Text Cell Processing routine, the Cells-in-Process indicator is set to on. A Text Cell Chain counter is set to one. A Cell within Chain counter is set to zero. The value of the maximum current dimension of the current chain is initialized to zero. A position of the leading edge of the first cell, which is the current horizontal presentation position, is determined. A position for the top edge of cells in this chain, which is the current vertical presentation position, is determined. A position for the leading edge of this group of cells is determined, which is the current horizontal presentation position for printing or other display of data in the data stream. Since this is the first cell of the group, the leading edge of the first cell will match the leading edge of the group.

55 The following programming design language listing is another form of the description of the above Set-Up for Text Cell Processing routine. This listing parallels the operation described above for Fig. 8.

## SET\_UP\_FOR\_TEXT\_CELL\_PROCESSING ROUTINE

```

5      Set Cells-in-Process indicator to 'on'

Set Text-Cell-Chain Counter to '1'

10     Set Cell-within-Chain Counter to '0'

Set value of Maximum-Y-Dimension of current chain to '0'

15     Determine position of leading edge of the first cell (current horizontal
      presentation position)

20     Determine position for the top edge of cells in this chain (current
      vertical presentation position)

25     Determine position for the leading edge of this group of cells (current
      horizontal presentation position)

```

## RETURN

35 After these initializing operations have taken place, the operation returns to Fig. 7. In Fig. 7, at 38 the Current Cell Processing routine is called which routine is shown in detail in Fig. 9. Referring now to Fig. 9, the Cell within Chain counter is incremented. Next, attribute values for the current cell are established in a two step process which consists of first copying the global attributes (from Fig. 6, block 21) to a control block for this specific cell and, second, updating this control block for this specific cell with any attribute values found in the OTC command. Thus, the OTC command can include attribute values which take precedence over the previously set global attributes in order to personalize particular text cells. Since this is the first text cell in the chain, it is not necessary, at this time, to process the final operation of updating the height of the cells which precede the current cell, as indicated at 42. That process will be described below

45 when applicable.

At the conclusion of the operations in 42, the process returns to the end of Fig. 7 which brings the operation back to the beginning of Fig. 6, at which time the next code in the data stream is tested at 20 to determine if it is a DTC command. Assuming that it is not, at 22 the code is tested to determine if it is an OTC command. Assuming that it is not, at 24 the process continues for other codes and controls in the data stream. If text or other presentation material is to be included in the text cell which has just been opened, that text or other presentation material is printed, displayed, sent to an output device, or saved in a file being accumulated for later output of presentation material.

After processing this control or data code, at 25 a test is made to determine if the Cells-in-Process indicator is on. In this example, it was turned on at 40 in Fig. 8. At 26 a test is made to determine if the base line of the text in the cell is greater than the height of the current text cell. The height of the current text cell is originally set by the OTC command and is kept in the attribute control block for the current text cell. If not, the operation continues back to 20 wherein the next control may be processed. If so, at 28 a test is made to determine if the height dimension attribute of the current text cell is "variable", another attribute

of the current text cell. If not, at 30 the user is notified that the text exceeds the size allowable for the current text cell. However, if the height dimension of the current text cell is "variable", from 28 the operation proceeds to 29 at which time the height of the current text cell is adjusted to be equal to the current base line of the text in the cell. In 29, after this adjustment, a test is made to determine if there are other cells  
5 which preceded this cell in the current chain of cells which require associated height adjustment. This would be true if attributes were set in the previous cells which required adjustments of the previous cells' vertical dimensions to equal that of the cell in the chain having the greatest vertical dimension. The operation thereafter loops back to 20 to test the next code in the data stream.

Assume now that an OTC command is encountered to define a text cell which is not the first text cell in  
10 a chain. In Fig. 7, assume at 35 that the text cell to be opened is, likewise, not the last text cell in a group. At 36 the Cells-in-process flag is on so the operation proceeds to 45 wherein a test is made to determine if the current cell to be opened is in the same chain as the previous cell. Assuming that it is, at 46 the position of the leading edge of this new cell is established. This position is equal to the position of the leading edge of the previous cell in the chain plus the width attribute of that previous cell. Next, at 38 the  
15 Current Cell processing routine of Fig. 9 is again called.

The following programming design language listing is another form of the description of the above Open Text Cell Command routine. This listing parallels the operation described above for Fig. 7.

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30

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55

OPEN\_TEXT\_CELL\_COMMAND Routine

5       If this is the last cell in the Text Cell Group

Then

10      Position the Cells of the last chain relative to the chain  
which precedes it (Process Position\_Cells  
Routine).

15      Draw the cells of this chain (Process Draw\_Cells Routine).

Set the Cells-in-Process indicator to 'off'

20      Else

25      If the Cells-in-Process flag is 'off'

Then

30      Process the Set-Up\_for\_Text\_Cell\_Processing Routine

Else

35      If the current Cell is in the same Chain as previous Cell

Then

40      Establish the position of leading edge of this new  
cell (equal to the position of the leading edge of  
the previous cell in the chain plus the width  
attribute of the previous cell).

45      Else

50

55

```

Process the Set-Up_for_Next_Chain_Processing Routine

5      End If
End If

10     Process the Current_Cell_Processing Routine

End If

15     RETURN

```

In Fig. 9, at 42 the operations previously described above are again carried out. Additionally, if previous  
 20 cells in this chain included the attribute setting to have their heights adjusted to equal the height of the  
 tallest cell in the chain, then, as required, the height of the cells which precede this current cell are updated  
 to match the height of the tallest cell in the chain. This operation employs the Adjust Cell Area routine  
 which is shown in detail in Fig. 10.

The following programming design language listing is another form of the description of the above  
 25 Current Cell Process routine. This listing parallels the operation described above for Fig. 9.

```

CURRENT_CELL_PROCESS ROUTINE

30
Add one to the Cell-within-Chain counter

35
Establish attribute values for the current cell by:

1) Copy Global Attributes to a control block for this
   specific cell
40

2) Update the control block for this specific cell with the
   attribute values found in the Open Text Cell Command.

45

```

As required, update the height of the cells which proceed this cell in  
 50 the current chain (process the Adjust\_Cell\_Area Routine).

RETURN

55 Referring now to Fig. 10, at 50 a determination is made of the maximum height of cells that have been  
 processed in the current chain. This maximum height is stored as the Maximum Y Dimension. At 51, if cells  
 have been processed in the current chain which have a variable height dimension, the operation proceeds

to 52 at which time the height dimension of those previous cells having a variable height dimension is set to the Maximum Y Dimension defined at 50. At 53 the next cell in the chain is checked in accordance with the test of 51 so that all cells in the chain having a variable height dimension end up having their height dimensions set to the Maximum Y Dimension. Thereafter, the operation proceeds to 54 wherein, for each 5 horizontal presentation position the vertical position determined in block 55 is established and saved. This vertical position value that is established and saved for each horizontal presentation position is the value of the vertical position of the bottom edge of the cell with which that horizontal presentation position is associated. This vertical position is saved with the attributes associated with the current text cell. The information will be used later to position cells and the next succeeding text cell chain, should such a text 10 succeeding chain be established. The operation then proceeds to 56 which loops back to 54 for the operation of 55 to be repeated for each succeeding horizontal presentation position in the current chain of text cells. At the conclusion of this process the operation returns to the bottom of Fig. 9 which returns to the bottom of Fig. 7 which returns to the beginning of Fig. 6.

The following programming design language listing is another form of the description of the above 15 Adjust Cell Area routine. This listing parallels the operation described above for Fig. 10.

#### ADJUST\_CELL\_AREA ROUTINE

```

20      Establish maximum height of cells that have been processed in current
          chain and store in Maximum-Y-Dimension

25      For those cells that have been processed in the current chain that have
          a variable height dimension,

30      Set that height dimension to the value in
          Maximum-Y-Dimension

35      Next Cell in Chain

          For each horizontal presentation position in the current chain,

40      Establish and save with the current cell attributes the
          value of the vertical position of the bottom edge of the
          cell in the current Text Cell Chain which corresponds with
45      with that horizontal presentation position. (This
          information will be used to position the cells in the next
          Text Cell Chain.)

50      Next horizontal presentation position

55      RETURN

```

Assume now in Fig. 6 that another OTC command is encountered. In Fig. 7, assume that at 45 the OTC command indicates that the cell to be opened is not in the same chain as was the previous cell. In this case

the operation proceeds to 47 which calls the Set-Up for Next Chain Processing routine that is shown in detail in Fig. 11.

At 60 in Fig. 11, the cells of the last chain in the group (which is the current chain being processed) are positioned relatively to the chain which precedes this chain. This is accomplished by the position cells routine of Fig. 12.

Referring now to Fig. 12, at 62 a test is made to determine if the current text cell chain is the first chain. If it is, the operation returns since there are no previous text cell chains with which to position the current text cell chain. Assuming that the current text cell chain is not the first chain, at 63 for each cell in the current chain an iterative or looping process is begun. Continuing to 64 another iterative or looping process is begun within the process begun at 63. At 64 for each horizontal presentation position within the cell a Maximum Vertical Position (MPV) is established at 65. The MPV is the position of the bottom edge of the cell or cells in the previous text cell chain which corresponds to the horizontal presentation position or positions of the current text cell. Information concerning the position of the bottom edge of previous cells was established in the Adjust Cell Area routine of Fig. 10. At 66 the operation loops back to 64 to establish the MPV for the next horizontal presentation position within the text cell. When all MVPs have been established within this cell, the operation proceeds to 67 to set the vertical location attribute of the top edge of the current cell to the greatest MVP. Then, at 68 this process is repeated for each succeeding cell in the current chain. When all cells of the current chain have been processed, the operation returns to 60 in Fig. 11.

20 The following programming design language listing is another form of the description of the above Position Cells routine. This listing parallels the operation described above for Fig. 12.

#### POSITION\_CELLS ROUTINE

25

If the current Text Cell Chain is not the first chain

30

Then

35

40

45

50

55

For each cell in the current chain,

5           For each horizontal presentation position within the  
cell

10           Establish Maximum-Vertical-Position, the position  
of the bottom edge of the cell(s) in the previous  
Text Cell Chain which corresponds with that  
horizontal presentation position(s) of the current  
cell. (Information concerning the position of bottom  
edge of previous cells was established in  
Adjust\_Cell\_Area Routine)

15

20           Next horizontal presentation position

25           Set the vertical location attribute of the top edge of  
the current cell to the Maximum-Vertical-Position

30           Next cell in current chain

35           End If

              RETURN

The next step in the Set-Up for Next Chain routine 60, Fig. 11 is to draw the last or current chain. This step calls the Draw Cells routine of Fig. 13.

Referring now to Fig. 13 at 70 looping or iterative process is entered for each cell in the current chain.

40 The steps of this process are shown at 71. First, the cell is positioned according to the top edge and leading edge attributes for the cell as previously established. Next, the area of the cell is colored according to the colour attribute for the cell. Thereafter, the area of the cell is shaded according to the shading attribute for the cell. Finally, the area of the current cell is outlined according to the top, bottom, leading, and trailing outline attributes of this cell. At 72 the operation proceeds back to 70 for the drawing for each of  
45 the succeeding cells in the current chain.

The following programming design language listing is another form of the description of the above Draw Cells routine. This listing parallels the operation described above for Fig. 13.

50

55

DRAW\_CELLS ROUTINE

5       For each cell in the current chain

10      Position the cell according to the top edge and leading  
edge attributes for the current cell

15      Colour the area of the current cell according to the  
colour attribute of the current cell

20      Shade the area of the current cell according to the  
shading attribute of the current cell

25      Outline the area of the current cell according to the  
top, bottom, leading, and trailing outline attributes of  
the current cell

30      Next cell in current chain

35      RETURN

The following programming design language listing is another form of the description of the above set-up for Next Chain routine. This listing parallels the operation described above for Fig. 11.

SET-UP\_FOR\_NEXT\_CHAIN ROUTINE

40

45

50

55

Position the Cells of the last chain relative to the chain which proceeds it (Process Position\_Cells Routine).

5

Draw last chain (Process Draw\_Cells Routine).

10

Set Cell-within-Chain Counter to '0'

Add one to the Text-Cell-Chain Counter

15

Establish a temporary position for the new chain by adding the maximum height of the cells of the previous chain to the value of the top edge of the previous chain. (This value will be adjusted for each individual cell in the chain as processing continues.)

20

Establish and save with the current cells attributes the location of the leading edge of the first cell in the new chain (set equal to the leading edge of the group of cells)

25

Set value of Maximum-Y-Dimension of current chain to '0'

30

RETURN

35 Returning to Fig. 7, at 35 if the OTC command is associated with the last cell in the text cell group, at 39 the cells of the last chain are positioned relative to the chain which precedes the last chain (Position Cells Routine, Fig. 12). Next, the cells of this last chain are drawn (Draw Cells Routine, Fig. 13). Finally, the Cells-in-Process indicator is set to off and the operation returns.

40 In summary a technique is provided for defining Text Cells into which text data can be formatted for presentation. The Text Cell defines the boundaries for the text presentation. Well known and understood text formatting concepts such as margins, tabs, line density, etc., can be applied to the text as it is formatted into the Text Cell.

45 The definition of Text Cells, including the Text Cell Attributes, the location and text content of the cells, the clustering of the cells into sets and the chaining of cells is controlled by two data stream commands which are the Define Text Cell, and Open Text Cell.

The Define Text Cell command specifies the parameters associated with a Text Cell Chain. The Define Text Cell includes a set of global parameters to be applied to each Text Cell to be presented following the issuance of this command. These parameters may be overridden for each individual Text Cell, but once that individual Text Cell is presented, all parameters revert back to the values specified in this command.

50 The Open Text Cell command causes an individual Text Cell to be established. That is, the area associated with the Text Cell is opened, the presentation parameters for the cell are set, and the text information which follows this current Open Text Cell, but precedes a subsequent Open Text Cell, is processed into this area. Each Text Cell within a Text Cell Chain begins with an Open Text Cell. The Open Text cell contains a 'Chain ID' that defines the Text Cell chain within a Text Cell Group to which the current cell belongs.

55 Each open Text cell contains a group of optional parameters. These parameters may be used to override the global Text Cell parameters specified in the Define Text Cell command for the processing of this specific Text Cell. If this override is used, it affects only the current cell, and the global parameters are

reestablished when processing in the current cell is completed.

Text Cells can have presentation attributes which are independent of the attributes of the text presented therein, and which govern presentation characteristics not usually associated with text presentation. For example, each Text Cell may have an outline attribute, a shading attribute, and a colour attribute. The 5 outline attribute governs the line type, line thickness, dimension and colour of the boundary of the Text Cell. The shading attribute governs the Pattern which fills the cell. That is, the area of the Text Cell may be filled with a specific shading Pattern. The colour attribute governs the background colour of the Text Cell area. That is, the area of the Text Cell is filled with the specified colour. Additionally, multiple text cells can be 10 specified on a presentation page, and the relationship of individual Text Cells to other Text Cells on the presentation page can be described.

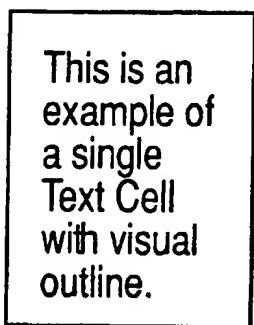
### Claims

- 15 1. A method of formatting text in a data processing system comprising the steps of:  
detecting a plurality of data items in a data stream, said data items including control command codes or text character codes or both;  
detecting an open text cell data stream command to open a text cell, said text cell having boundary and presentation attribute information associated therewith;
- 20 2. opening said text cell in response to said open text cell command;  
presenting said text cell in accordance with said presentation attribute information; and  
formatting text within said text cell.
- 25 3. A method as claimed in Claim 1 further comprising the step of:  
detecting a define text cell command, said define text cell command including default attribute information applicable to subsequent text cells opened in response to subsequent open text cell commands.
- 30 4. A method as claimed in Claim 2, further comprising the steps of:  
determining whether the open text cell command includes information specifying one or more presentation attributes of the text cell; and if so,  
selecting, according to a predetermined choice, whether to present the text cell using the one or more presentation attributes specified in the open text cell command or using the default presentation attributes specified in a previous define text cell command.
- 35 5. A method as claimed in any preceding claim, further comprising the step of:  
concatenating more than one text cell into a chain of text cells.
- 40 6. A method as claimed in Claim 4 further comprising the steps of:  
concatenating more than one chain of text cells into a group of text cells; and  
aligning the top of an N+1 chain of text cells with the bottom of an Nth chain of text cells.
- 45 7. A method as claimed in any of Claims 2 to 5, further comprising the step of:  
establishing a minimum height of said text cell responsive to a minimum height attribute included with said define text cell command.
- 50 8. A method as claimed in Claim 6 or Claim 7, further comprising the step of:  
extending the height of said text cell responsive to both a variable height attribute associated with said text cell and a content to be presented within said text cell which exceeds a default minimum height of said text cell.
- 55 9. A data processing system comprising means for performing a method as claimed in any preceding claim.

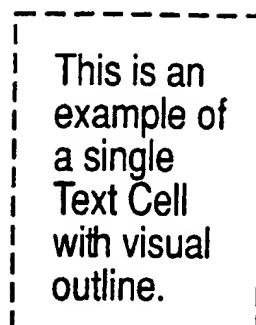
50

55

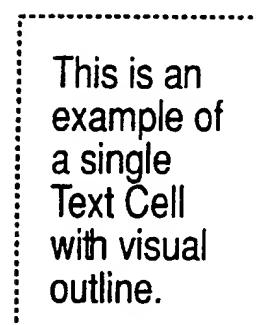
Thin Line



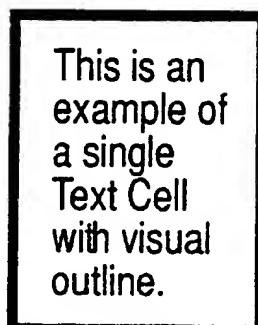
Dash Line



Dot Line



Thick Line



No Line

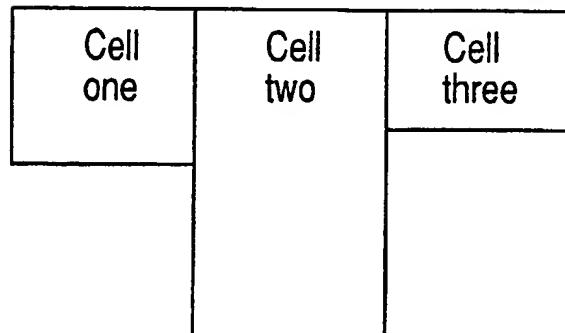
This is an example of a single Text Cell with invisible outline.

FIG. 1

Cell Number 1	Cell Number 2	Cell Num. 3
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FIG. 2

Before Height Adjustment in Cell Chain



After Height Adjustment in Cell Chain

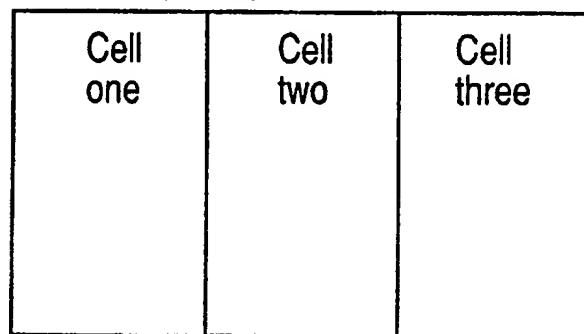


FIG. 3

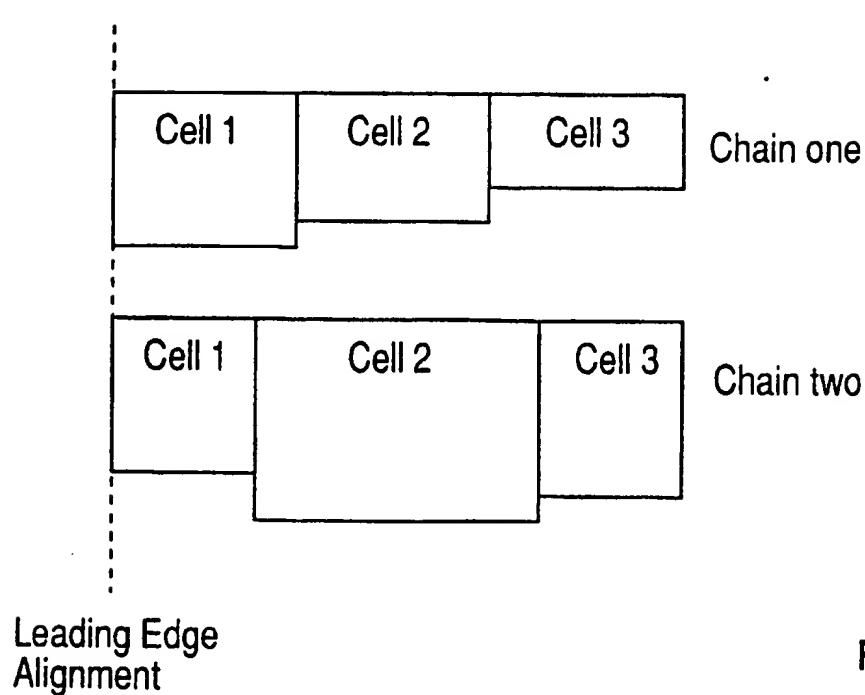


FIG. 4

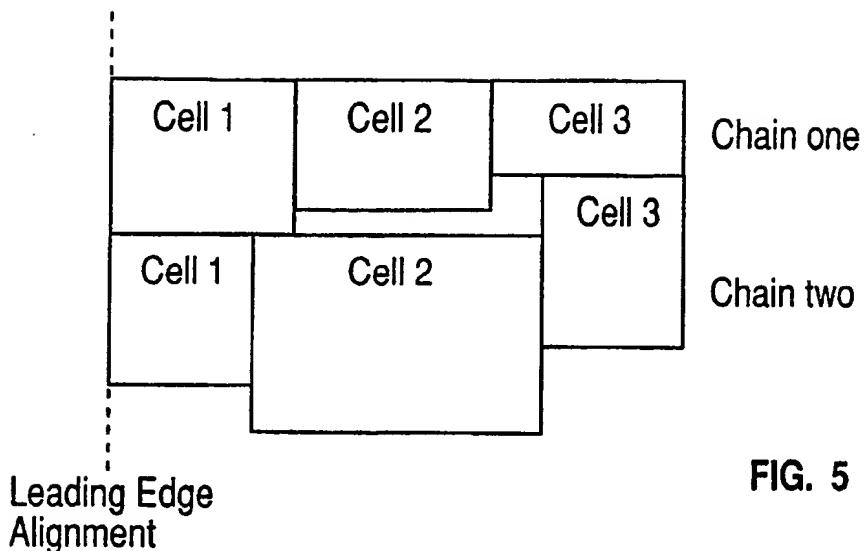


FIG. 5

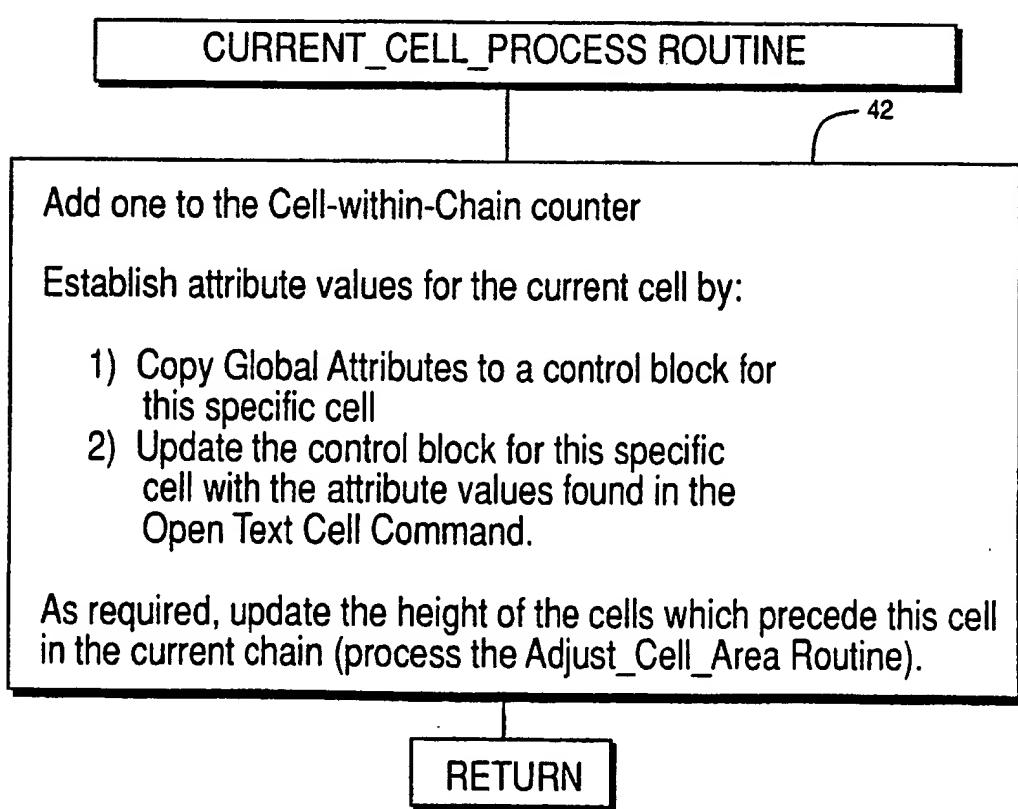
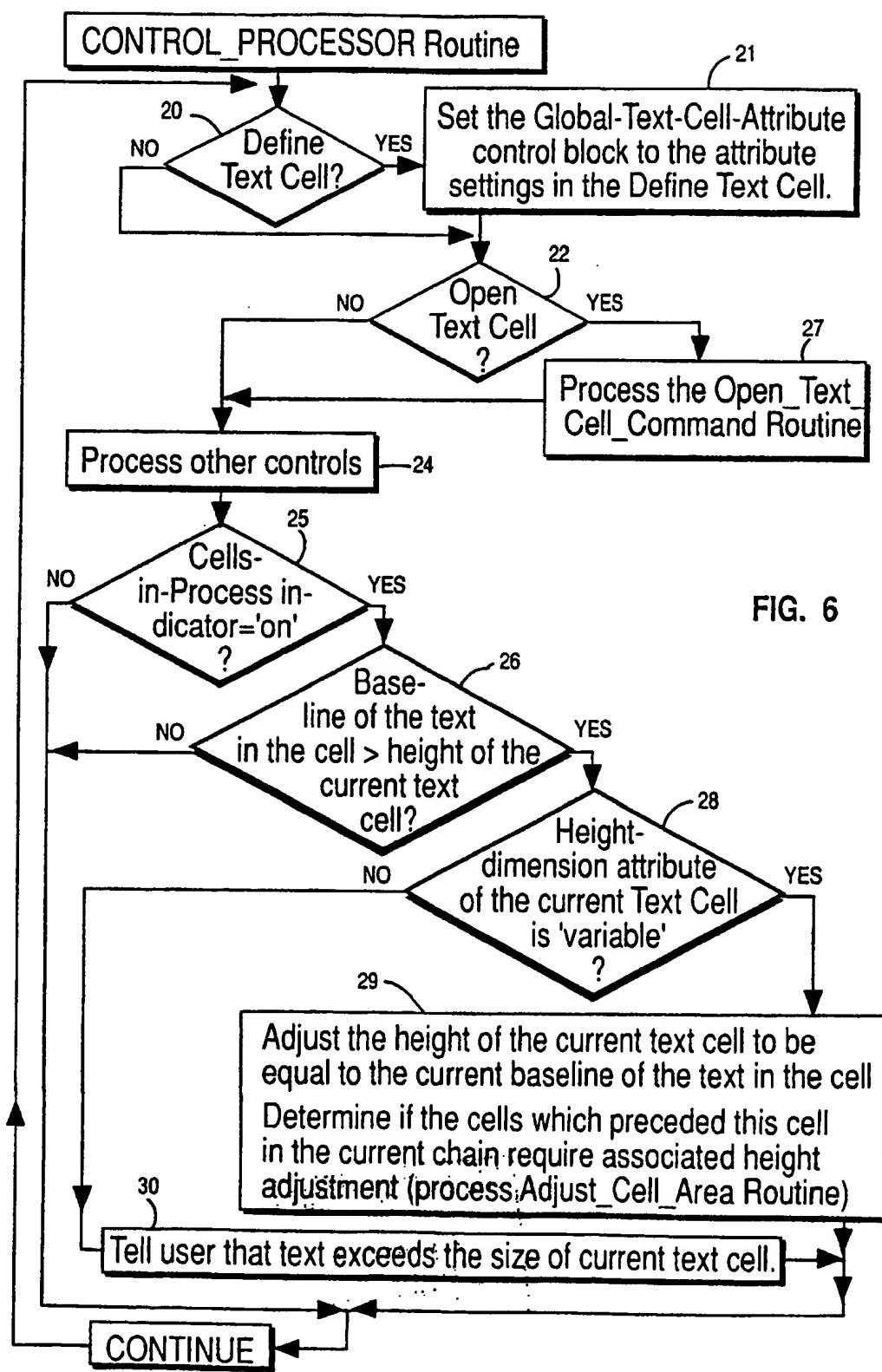


FIG. 9



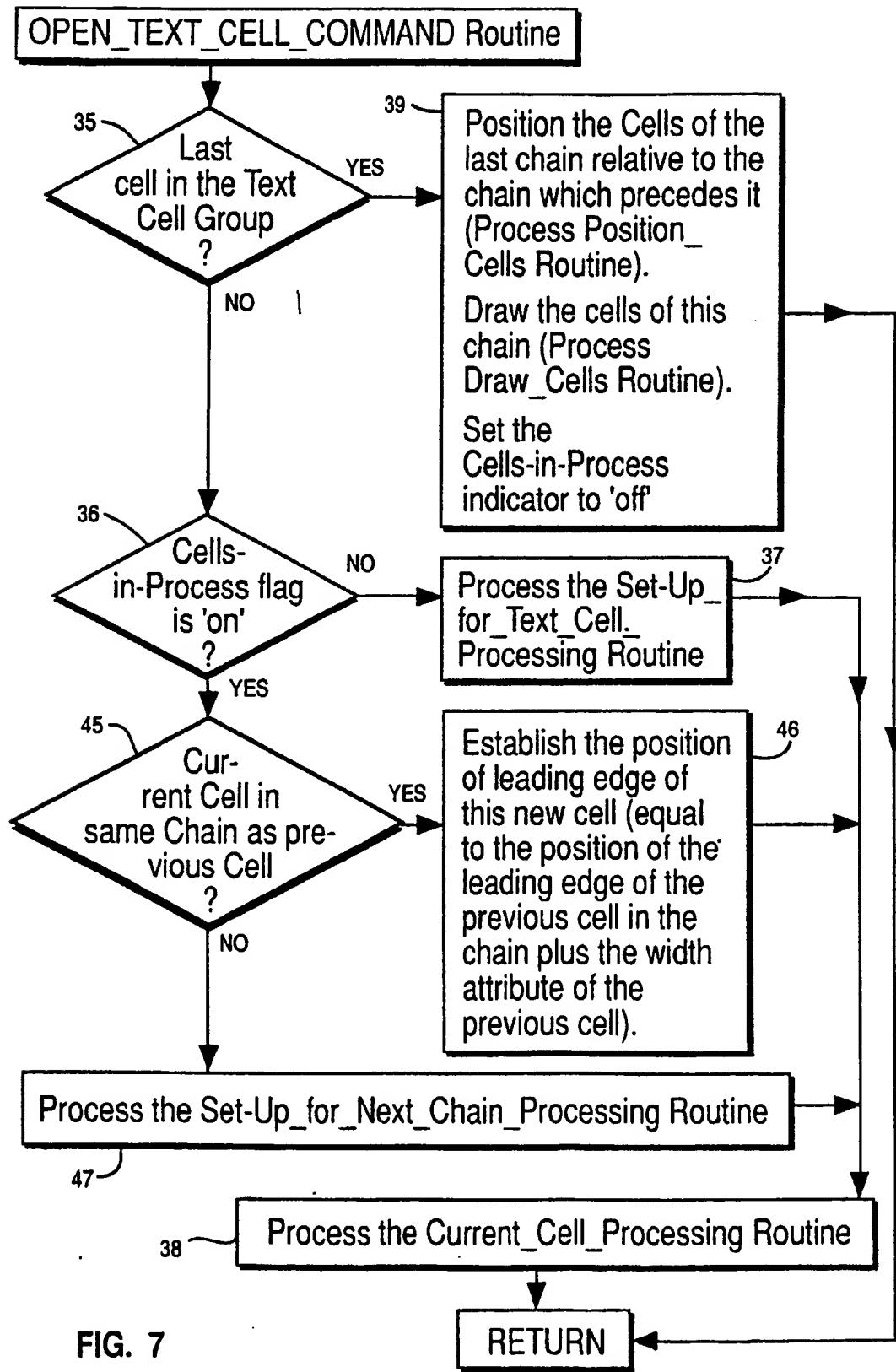


FIG. 7

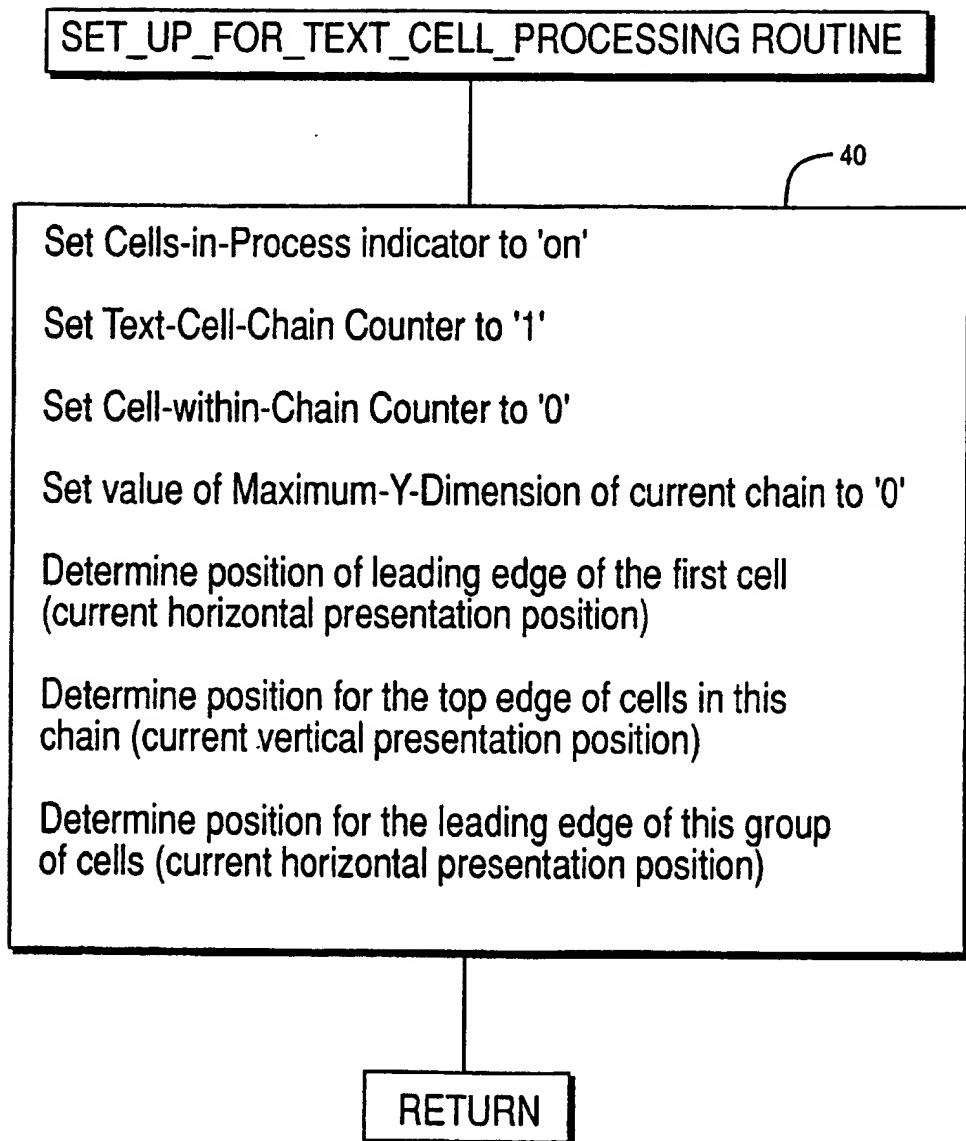


FIG. 8

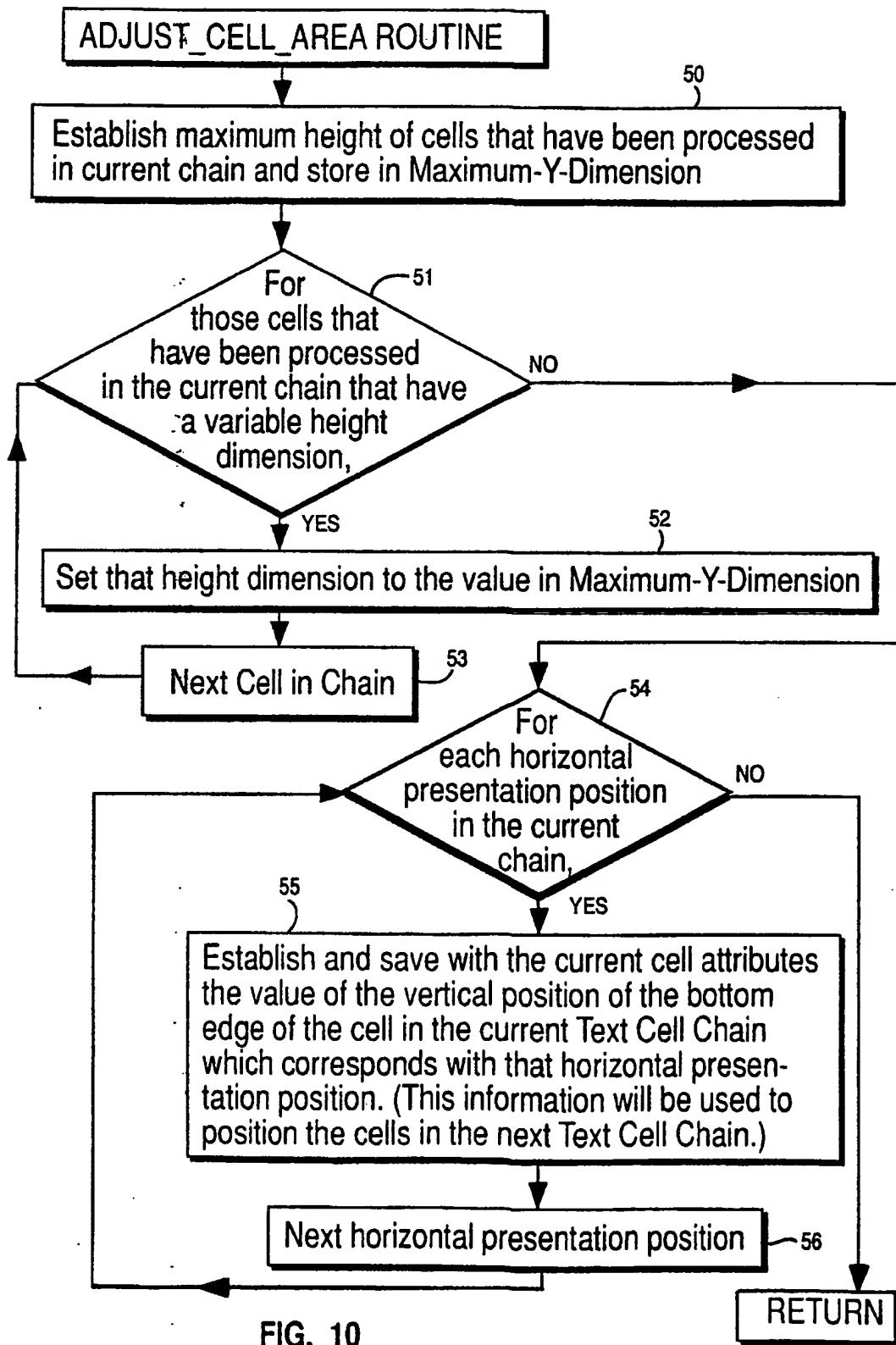


FIG. 10

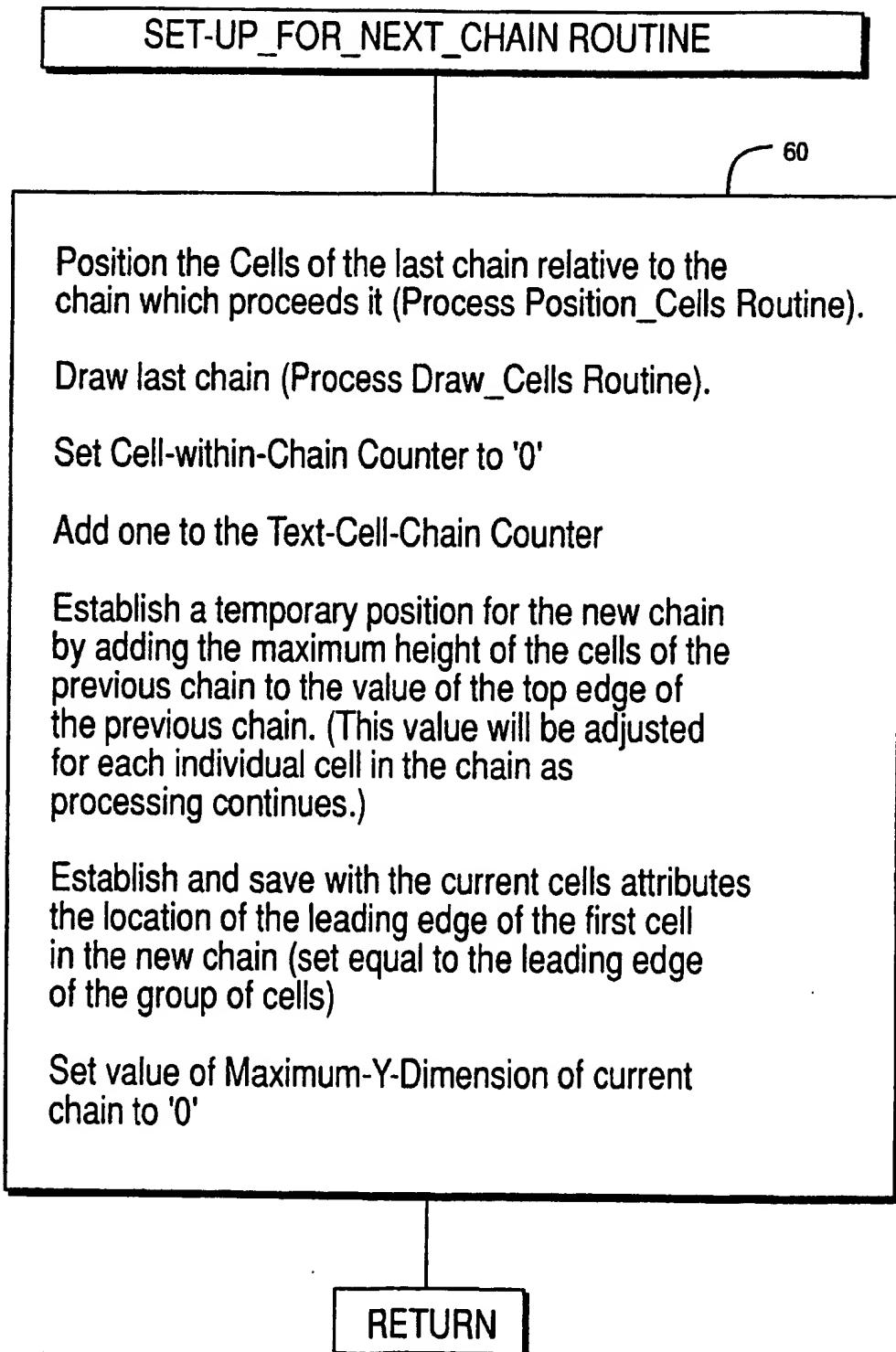
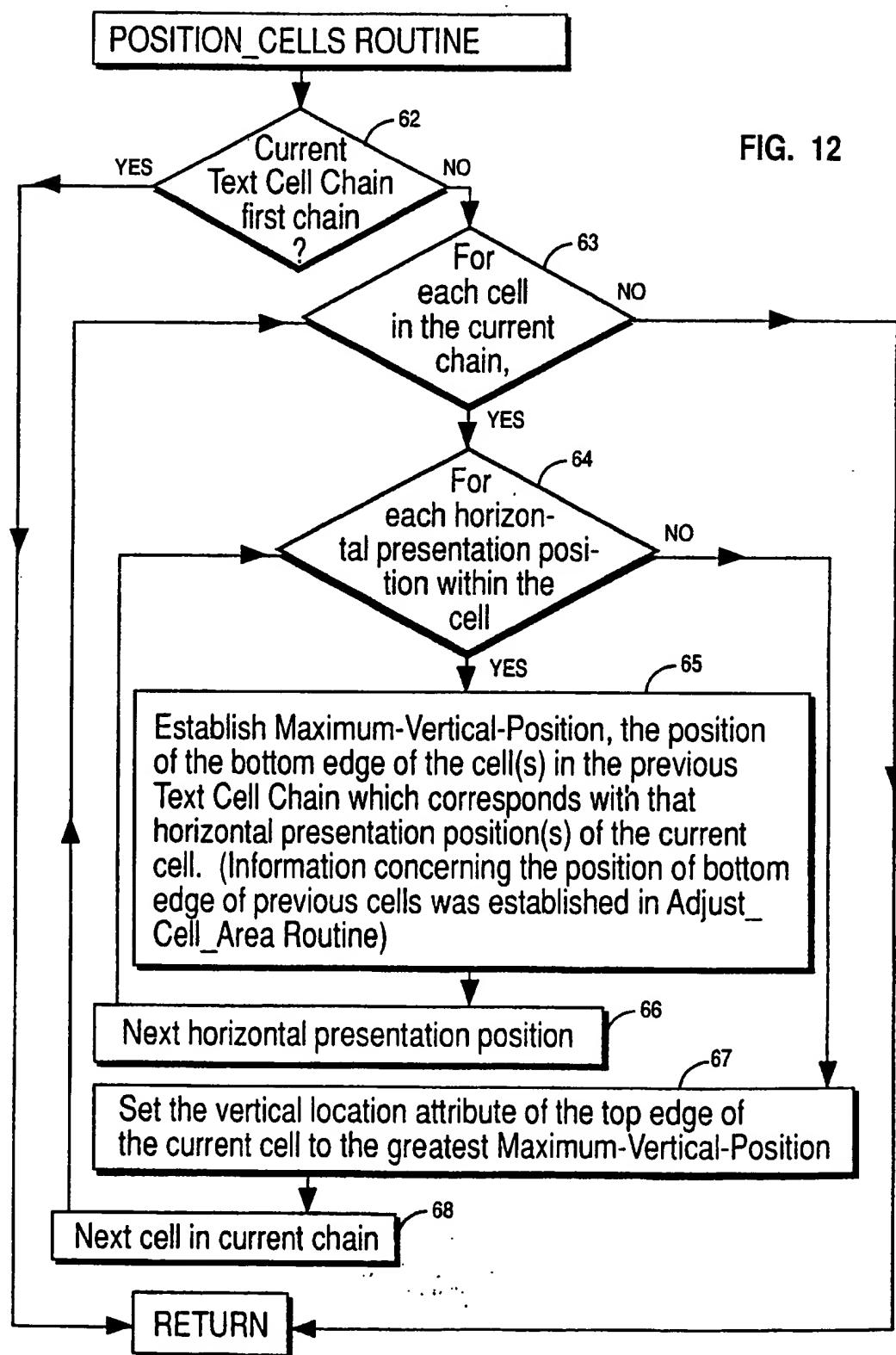


FIG. 11



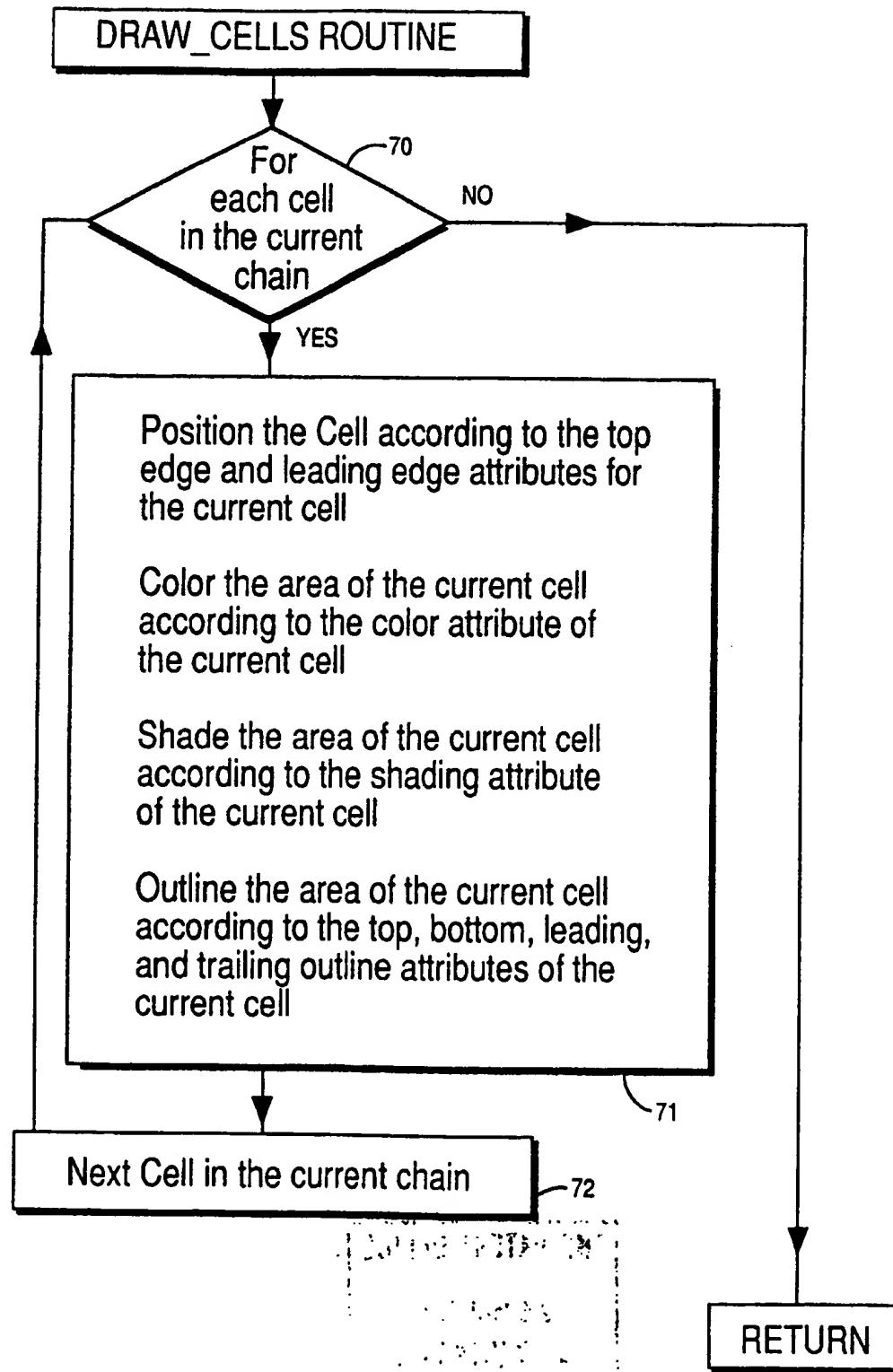


FIG. 13